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Editorial

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Welcome to *Green Materials*, a new international cross-disciplinary journal focused on its namesake field, one which is growing not only in breadth and depth but also importance. In this first editorial, I hope to outline our reasons for starting this endeavour, the importance of green materials and our vision for the journal's future.

What does 'green' mean? We are obviously not talking about a coat of green paint on a plexiglass wall. The move towards research in green materials has risen alongside the growth of green chemistry. Paul Anastas and John Warner defined green chemistry as 'the utilisation of a set of principles that reduces or eliminates the use or generation of hazardous substances in the design, manufacture and application of chemical products'.¹ In the context of materials chemistry, this is captured in a number of important initiatives: developing biodegradable plastics and other polymer products, sourcing renewable materials, introducing environmentally benign catalysts, minimizing production waste, developing clean synthesis procedures, enhancing atom utilization, changing reaction media and lowering reaction temperatures or pressures.² These ideas, coupled with a global movement towards sustainability, industrial ecology and improved efficiency, have driven us towards our current reality: a rapidly changing materials landscape.

Consumers seeking environmentally friendly alternatives traditionally sought only natural products – bamboo floorboards, hemp fabrics and paper bags are classic examples. Today, consumers expect their environmentally conscious purchasing decisions to meet much stricter criteria: products need to meet or exceed the performance of existing products, have a clear advantage when examining the full life cycle of the material, all while being competitively priced (Figure 1). Even under these daunting metrics, green materials are moving from the academic and industrial laboratory into real market applications. Successful ventures, such as NatureWorks' Ingeo poly(lactic acid) polymers³ and DuPont's renewable Sorona materials,⁴ have found applications in green packaging, serviceware, bottles, clothing, biomedical devices, films and specialty polymer industries. Poly(hydroxyalkanoates), polysaccharides and protein-derived polymers also have a growing importance in both polymer and materials science. This success is built on a foundation of fundamental science and engineering pioneered in academic, industrial and government laboratories around the globe.

Green Materials exists to serve the needs of the diverse international community of chemists, physicists and engineers, providing

a forum where each can communicate their original and innovative findings and provide inspiration and direction towards expanding the influence, increasing the breadth and improving the quality of green materials. The journal will publish work covering the entire spectrum of product development including original fundamental research, proof of principle studies, process chemistry research and life-cycle analysis. We seek papers detailing the design and development of environmentally improved chemicals and materials, the use of sustainable resources, the development of alternative catalysts or processes that reduce environmental impact and the application of new technologies and products contributing towards a sustainable future.

I am not alone in pioneering *Green Materials*. My teammate and co-editor-in-chief is Qing Wang, Materials Science and Engineering, Penn State University. Together we will endeavour to provide you with the best forum possible to publish your work, read the latest innovative science and discover collaborations. The journal, and our work, is loosely divided into two broad headings: Polymers and

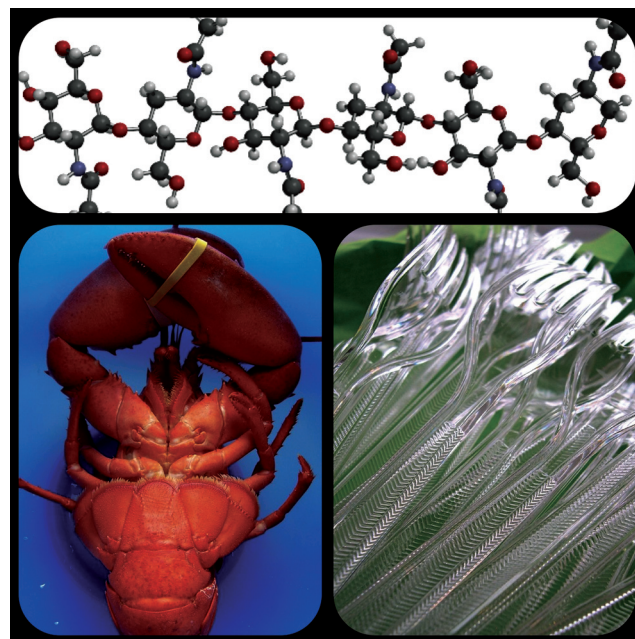


Figure 1. Both monomers and polymers obtained from renewable resources, such as the chitin derived from crustacean shells, have found their way into many products.

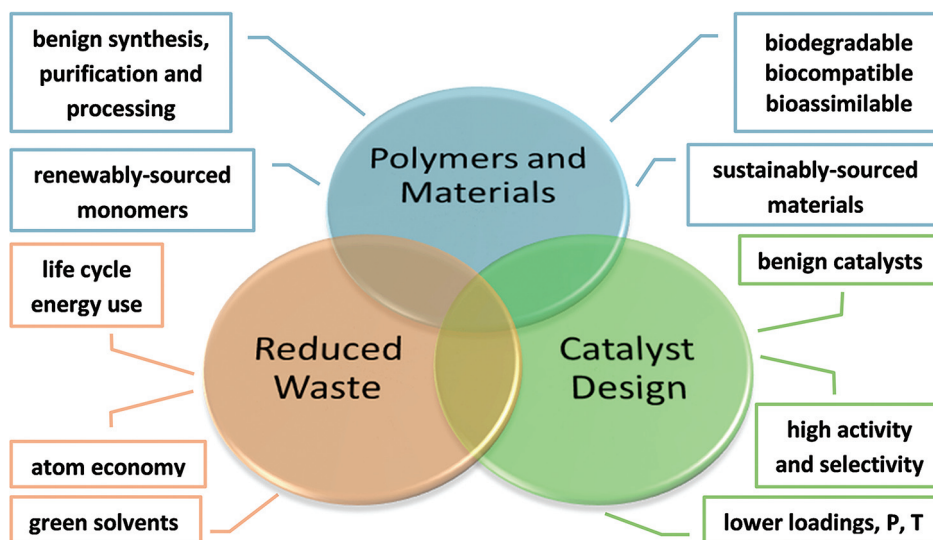


Figure 2. A narrow window into the breadth of green materials research.

Materials. Polymer research will capture the following: the synthesis and development of renewable and biodegradable polymers, the rheology and applications of said materials, environmentally benign methods for polymer synthesis and catalyst development. Materials research will capture the following: functional green materials, properties and applications of environmentally friendly materials, benign processing and manufacturing and sustainable materials engineering.

My expertise and the focus of our group's research in green materials is at the interface between renewable and biodegradable polymers, catalyst design and waste reduction (Figure 2). Our team develops catalysts for the living and immortal ring-opening polymerization of cyclic esters such as *rac*-lactide and β -butyrolactone, with a particular interest in stereocontrol and its effect on the properties of larger macromolecular frameworks.^{5,6} We also seek to replace toxic mediators of radical and coordination-insertion polymerizations with benign alternatives that may eliminate the need for solvents or co-catalysts and reduce product purification requirements.^{7,8} Our editorial board contains a much broader scope of expertise from process engineering to commercial product development.

Full research papers, short communications, tutorial and comprehensive review articles are sought. All manuscripts will be carefully considered, rapidly published and vetted by a distinguished team of international experts. Prospective authors are encouraged to explore the topics explicitly mentioned above, but are also free to submit their research in related fields. We hope to paint the definition of green materials with a broad brush and include all scientific

developments that offer clear improvements to product sustainability and/or impact within the broad scope of materials chemistry and engineering. To submit an article, please visit our website: www.editorialmanager.com/gmat.

Green Materials has been championed by *ICE science*, an imprint of *ICE publishing*, an institutional publisher disseminating important fundamental and applied discoveries since 1836. With the help of their dedicated and efficient publishing staff and an impressive international editorial board featuring global leaders in environmentally and fiscally sustainable macromolecules, materials, mediators and methods, we are driven towards making this new journal a success. Special recognition is reserved for our three Associate Editors: Jaime Grunlan, Texas A&M University, Andrew Dove, Warwick University and Youn-Woo Lee, Seoul University who will lead our initiatives in the Americas, Europe and Asia, respectively. I've been particularly inspired by their elegant research into supercritical fluids as a reaction medium for green materials synthesis,⁹ functional materials as fire retardants and gas barriers^{10,11} and organic catalysts for the ring-opening polymerization of cyclic esters.¹²

With ever-increasing strain on petroleum resources, every aspect of polymer and material production is being challenged. The importance of fiscally and environmentally responsible materials has never been higher. These green materials look to reduce or eliminate hazardous substances in their design, manufacture and application but most importantly lower the environmental impact of our modern world. In my mind, the timing for the creation of this journal couldn't be better. I am excited and I hope you are too.

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